

**CENTRALIZING INFORMATION USING A RICH
INTERNET APPLICATION (RIA)**

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Web application is an application delivered over a network to users from a centralized web server. It began with HTML document invented by Tim Berners Lee in 1989 (Sklar, 2000). It became favored because of it is easy to use, free, simple, and low deployment cost. However, according to O'Rourke (2004) the traditional web application is being replaced by a more robust, responsive and visually interesting application. It is called RIA. RIA is an online application that includes a level of functionality and interface complexity formerly ascribed only to desktop applications (Skinner, 2003) and according to Macromedia (2003), it is a next generation web application that combines the functionality of desktop software with the broad reach and low cost deployment of the web. Instead of loading the processing to the server, it transfers some of the processing job to the client and making the transaction much faster. With the emergence of multimedia that brings the richness of the web and also the requirement to have faster and much simpler online interaction, RIA is the solution to it.

As the newest solution to dynamic internet application, RIA is the chosen approach in developing the prototype for this research. Using one of RIA well known

technologies such as Macromedia Flash MX 2004, XML and Microsoft Information Services server, a prototype of web application is developed in order to achieve main objective of this research which is to centralize information of multimedia lecturers in FIT, UUM. After the completion of the prototype development, usefulness and ease of use test is conducted on target users.

1.2 Problem Statement

Currently, each lecturer in FIT, UUM is required to have website individually. Logically, the amount of website increases in proportional with the addition of new multimedia lecturer, hence the task to ascertain their information using traditional method becomes repetitive and enervative. Thus, this research tries to centralize information from each multimedia lecturer's website in single interface of web application using RIA approach in order to solve the stated problem.

1.3 Research Objectives

Based on the problem statement indicated above, this research will focus on:

- Developing a simple prototype of web application using RIA approach to centralize information.
- Testing the web application's perceived usefulness and ease of use on targeted users.

1.4 Research Scope

This research focuses on centralizing information for lecturers from Multimedia Department of FIT.

1.5 Significant of Research

It is expected that the outcome of this research could ease the process of accessing lecturers' information and the time taken to do the task will be decreased.

1.6 Report Structure

The report consisted of six chapters. Chapter One begins with introduction of the research conducted. The research's problem statement, objectives, scope and significant of it are elaborated. Comes Chapter Two with literature review. It explains about RIA in details and the testing method chosen. Next is Chapter Three that consists of research methodology. This chapter introduces the methodology chosen for the research and the phases involved in it. Chapter Four tells about the prototype development inclusive explanation regarding all the steps involved in methodology chosen for prototype development. All the results and findings of the research are presented in Chapter Five in graph and table forms of mean analysis. Finally yet importantly is Chapter Six with discussion, conclusion, and future works of the research and followed by appendixes.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The literature review starts with analysis on the on going trend in the web based application, RIA and it stresses on the definition, impact, purpose, technology, competitors, and the future of this evolving technology.

The belief of the Macromedia is developing through experience. According to a quote cited at the Macromedia official website, experience matters. Macromedia is motivated by the belief that great experiences build great businesses. According to Macromedia, its software empowers millions of business users, developers, and designers to create and deliver effective, compelling, and memorable experiences, be it on the Internet, on fixed media, on wireless, and on digital devices (Macromedia, 2003).

In May 2003, Macromedia (CreativePro, 2003) announced that companies such as Dai Nippon IMS (America) Corp., a division of DNP, Inc, Ltd. and Hess Microgen found clear benefits to deploying RIA, including increased sales, quicker task completion, decreased hosting costs, and faster development time.

In addition, a recent IDC white paper (Duhl, 2003) found that RIA, which use Macromedia Flash Player to free users from the page paradigm of traditional web applications, may create a fundamental shift in the experience of Internet applications. Thus, it deals with the easy maneuvering of data as well as navigation.

All the big real world examples and huge ROI highlights the worth of the RIA. Al Ramadan, who is the executive vice president of Macromedia said, "The Macromedia MX product family is helping companies deliver these experiences faster and, once they are developed, they are delivering impressive, measurable returns."

RIA is based on a new software model that uses executables (programs) instead of exchange of pages like traditional web. An executable-powered internet is like a two ways conversation. There are brains at both ends of wire, resulting in a high-IQ interactive, valuable conversation. Work is performed at both places, greatly increasing the richness of experience, the relevancy of the content, and the amount that can get done." (Colony, 2000).

In order to better understand RIA, the next section will be defining it specifically and listing some of its important characteristics and also portraying the position of it among other existing Internet solutions.

2.2 RIA Explanation

Rich Internet Application can be defined as "the best of desktop, meets the best of web" (Webster, 2005). It can be compared to as Enterprise RIA, which deals with applications of the scale of Bank transaction over web, reservation systems, and e-commerce.

The term RIA was first presented in Macromedia whitepaper in March 2002. However the concept carries by RIA has been around for several years under few different designations such as X-Internet and Rich Client. Being a breed application, it is a cross between Web applications and traditional desktop applications. Unlike the traditional web application, it transfers some of the processing to the client end. Some of the other emphasized characteristics of RIA are (Laszlo System, 2003):

- It runs in web browsers installed with Flash Player that can be obtained for free from Macromedia website.
- It can also be executed as Flash execute file which means no requirement for web browser.
- It runs locally, hence much more secured.
- It provides significant interactivity or complexity.
- It supports high volume transactions.
- It enables multi-step task-based activities.
- It allows the display of multiple media types embedded in a single user-interface.
- It supports real-time response such as instant messaging or real-time information updates.

There are many other solutions in order to optimize the internet usage. Obviously, RIA is not the only one exists in this world. Nevertheless, it is becoming one of the prominent and promulgate to internet solutions as depicted in Figure 2.1 (Invision.net, 2003).

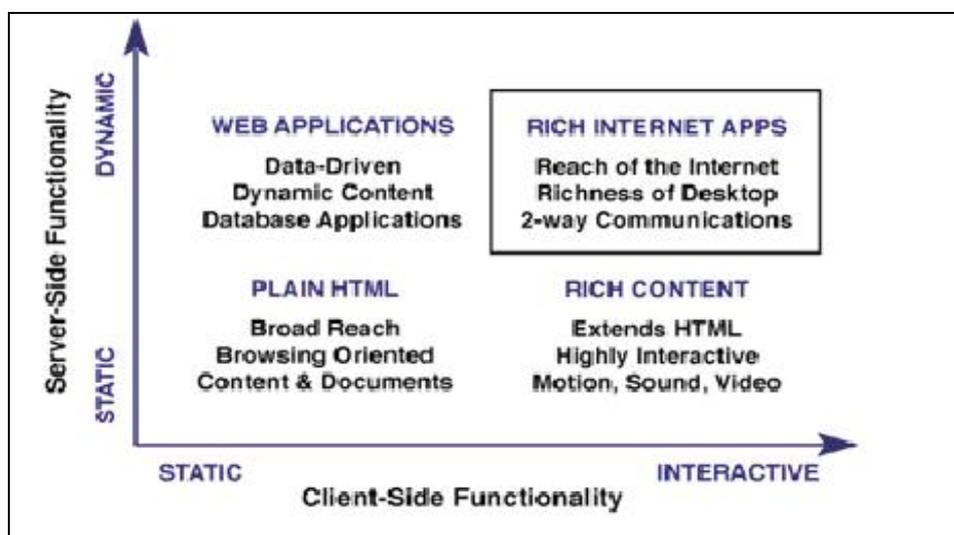


Figure 2.1: Spectrum of Internet Solutions

It is not an act of fairness to discuss about RIA as the newest and better Internet solution without even indulging in detail of the differences that it brings which make a huge different from other solutions. Hence, the next section will be comparing RIA with the traditional technology of client-server.

2.3 Comparison with the Traditional Client-Server Technology

In the mid-1990s, with explosive growth in the Internet and the World Wide Web, applications using personal computers connected to the Internet has grown (answers.com, 2006). Coined ‘thin-client’ computing, this new technology promised to lower the cost of developing and delivering applications to end-user desktops.

This technology centered on a very thin client based on HTML and powerful application servers that dynamically composed and delivered ‘web pages’ to web browsers. So far this model has proven successful. However, it has also suffered from significant drawbacks and limitations (Dowdell, 2005).

Just about every study has shown that while traditional client-server applications are viable, they require a larger commitment in terms of IT personnel and resources (Canton, 2005). In addition, it also requires the server to carry out almost all the processing as illustrated in Figure 2.2 (Netscript , 2002). The client was passive and displayed only the static content like HTML.

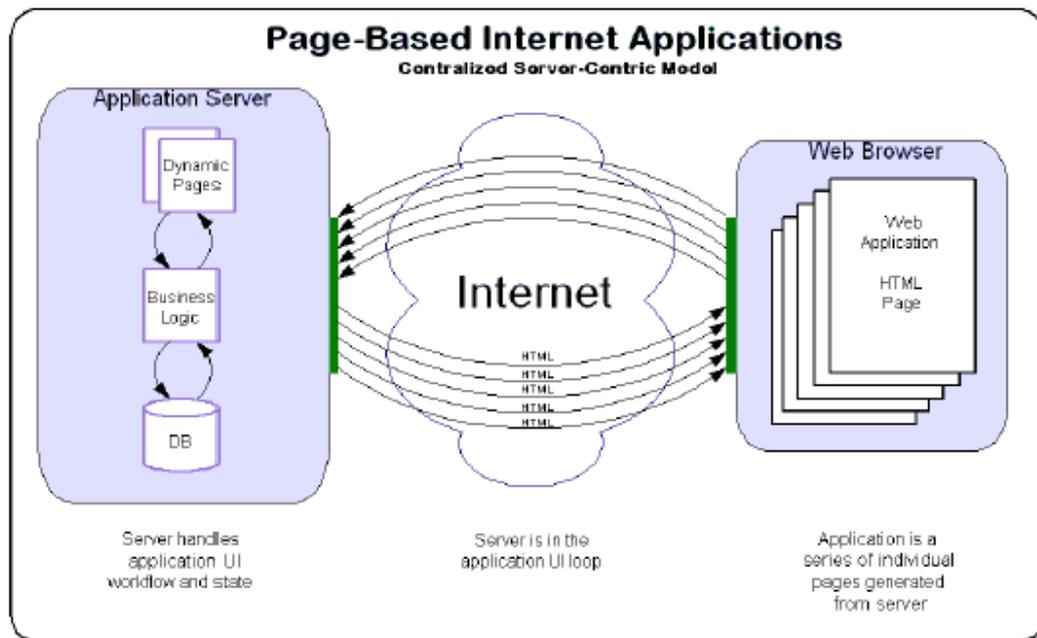


Figure 2.2: Traditional Page based application model

This required the data and the contents to be passed to the server all the time. The passing of data involved communication channel, server processing, and security threat. With web based application on rise and used for critical purpose, the bad effects of congestion, security threat, processing power limitation are not feasible.

Thus, the need of application that requires less data passing over the channels to the server and server processing is obviously critical. Since RIA takes advantage of the client's CPU instead, they offer real-time user-interface options that are impossible with the standard HTML and the browser-based Web applications. Figure 2.3 shows the model of RIA process (Netscript , 2002).

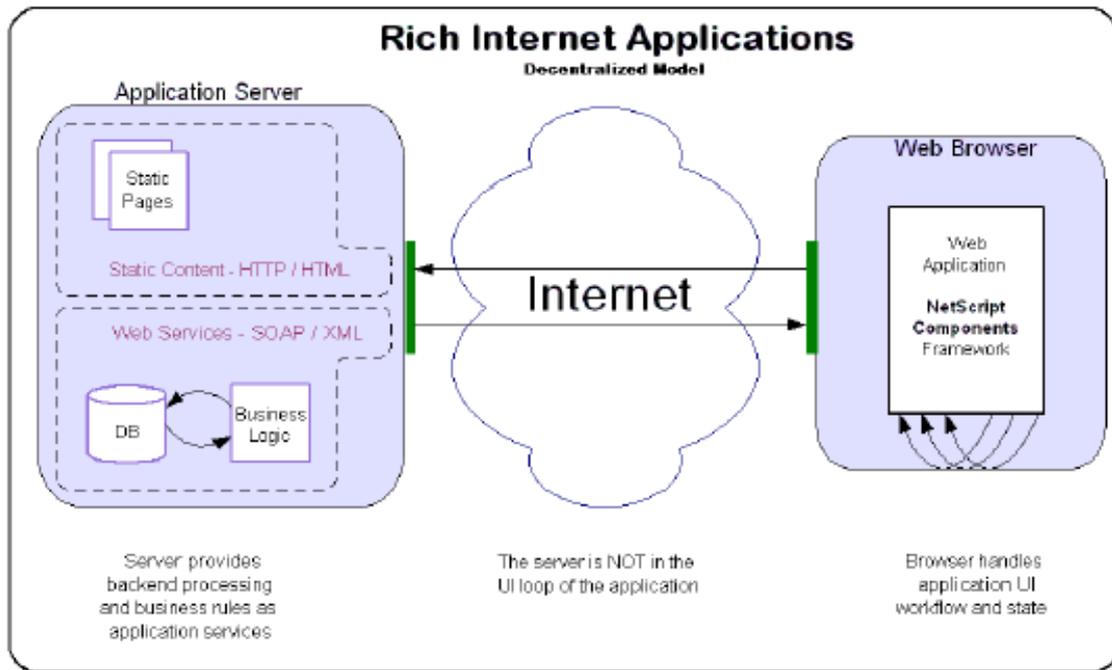


Figure 2.3: RIA Model

Another significant difference between RIA and traditional client-server technology is the style of viewing information requested by users. The traditional web based applications requires multiple browser screens each time user request for new information as depicted in Figure 2.4 (Macromedia, 2003). Examples of web sites with pop up screens can be considered one of the epitomes.



Figure 2.4: Multiple-page Web Application

In spite of using multiple browser screens, RIA replaces all of them with a single interactive screen application as shown in Figure 2.5 (Macromedia, 2003). A single screen application means that user can acquired distinct information within a single screen. This makes the user experience much more comfortable and also to evade user confusion while using the application.



Figure 2.5: Single-screen RIA

As for RIA development, there are plenty of choices for a developer to choose and each choice comes with its own individuality of advantages and disadvantages. The next section is about the technologies available for RIA development and which one was selected as the main development tool for this research.

2.4 Technology and RIA

There are many tools and languages available nowadays that offers the capability to develop RIA as listed in Table 2.1 along with the features available (Surveyer, 2004).

Table 2.1: Technologies for RIA Development

Technologies for RIA Development						
Vendor	IDE	ClientTech	Plugin	Rich Media	Offline	Noteable
Adobe XDP	VD,TED,P	JS, XML, PDF	PDF	Full	yes	Security features
AltioLive	VD,TED,P	XML, Applet	JVM	some	?	easy to develop in
DreamFactory	full	XML	no	most	yes	IDE runs in browser
Droplets	3rd party	Java Servlet	JVM	most	no	very fast, alerts
Isomorphics	SDK	DHTML, XML	no	some	no	Many widgets
Laszlo	basic	Flash, XML	Flash+Lzl	Full	yes	easy to learn, rich
Macromedia Central	Flash MX	Flash	Flash+Ctl	Full	yes	alerters, portlets
Macromedia Flex	full	Flash, XML	Flash+MXML	Full	no	Collaboration
Nexaweb	full	Java+XUL	JVM	most	?	neat use-XUL,SVG
Q-link	full	XML,XForms	no	some	yes	BPM model design

As shown in Table 2.1, there are varieties of tools and languages with distinguishing level of proficiency in developing RIA. Some are very strong in certain area such as security and some are strong in others such as interface creation. In spite of many technologies available in markets recently, Macromedia's tool that emblems the greatness of the company in web and animation development which is Macromedia Flash MX Professional 2004, has been chosen as the significant tool for this research.

Primarily, RIA needs to have engaging and interesting user-interface and a tool that can propose the simplicity of interface creation is Macromedia Flash MX Professional 2004. Its technology comprises component technology such as Web Services, Data Connectors, Data Binding, and ActionScript 2.0 to ease the process of developing Object Oriented applications. It is imperative that developers learn to embrace Object Oriented development techniques to build ever more complex applications such as RIA with Macromedia Flash MX Professional 2004.

In order to pass the data between the client and the server, technologies such as Flash Remoting MX, Flash MX Professional 2004 and its components such as Web Service support, Web Service Connectors, XML connectors and RDBMS connectors are available by Macromedia. The selection of these tools depends on the complexity of the application and the size of the database. For the purpose of the simple RIA prototype of this research, a proper blend of the above mentioned technologies offered by Macromedia were selected. Macromedia Flash MX Professional 2004 was used as a front end and the XML connectors as a data manager to pull the data from xml file.

Using Macromedia Flash MX Professional 2004 as the tool, there are so many areas of RIA applications and the benefits that come of its applications are not to be belittled. Therefore, in the next section the aforementioned matters will be discussed.

2.5 RIA's Applications and Benefits

Recent and growing craze is to do almost any transactions using the Internet, hence the web. Growing interest in Internet transaction brings the phrase "Business at the tip of your finger" and one of the reason stakeholders moving towards electronic business in web is because it boosts the ROI of their business and provides extra profits. With RIA, this vision can be realized by improving the user-experience,

leveraging existing tools, and existing investment in online infrastructure (Adams, 2005).

According to IterationTwo.com (n.d.), there are four applications of RIA where each of them conveys disparate benefits. They are management dashboard, improve delivery of internal business applications, guided selling, and self service applications. The first application is about integrating data from dissimilar systems and represents them with eye-candy multimedia presentations such as chart, graph, and data drill down. The benefits of this first application are faster decision cycles from better data, high application utilization rates, interactive visualization of data, and reduction in call-centre training costs. Following in the second, organizations that implement RIA can enable browser-based delivery of internal business software instead of deploying thick-client applications, desktop applications or managed application delivery. Among the benefits of browser-based RIA are low cost of deployment and maintenance of browser applications, it fits upon existing systems infrastructure, and reduces cost of managed desktop environment.

The third application is useful for electronic shopping applications. Guided selling is the solution that will guide customers in finding products needed by them. RIA is able to guide customers from the start until the end of shopping process, all in one seamless experience. This application increases transaction frequency and conversion rate of viewer to buyer, and decreases call-centre cost, network, and server-load. Finally, RIA can help improve online services as well such as e-banking by streamlining processes that usually require multiple steps and pages to one seamless experience without page refreshes. This application helps to increase application usage by end-users and reduces operational costs by keeping customer

online, and off the phone. It also helps in reducing TCO of Call Centers and gaining more effective up-sell and cross-sell.

In the conducted research, not all of the applications and benefits mentioned above applied and occurred because the RIA prototype developed was a simple one and does not related to any e-business or banking at all. The domain and scale of the development were also smaller; hence, it is not comparable to the applications and benefits gained by bigger company like IterationTwo.com. However, there are some common similarities in the applications stated by IterationTwo.com with the prototype's applications such as combining data from different source without page refresh and cut the many steps on information finding into a seamless process.

2.6 RIA in UUM

In Malaysia and UUM generally, and FIT specifically, RIA is not a well-known solution to deploying information online. Therefore, the more reason for this research to be conducted in order to be an eye opener to the current technologies used to develop websites in UUM. As one of thick-client technology, it exists for quite sometimes but has not been as popular as thin-client technology.

This research has been conducted in a smallest domain possible as an entrance for RIA in UUM, which is Multimedia Department of FIT. The main objective of it is to centralize multimedia lecturers' information using RIA approach instead of the traditional way (thin client) which is recently developed using PHP, JavaScript, MySQL as a database and Mambo as content management system. Recently, multimedia lecturers' information is scattered and contains in different pages as depicted in Figure 2.6.

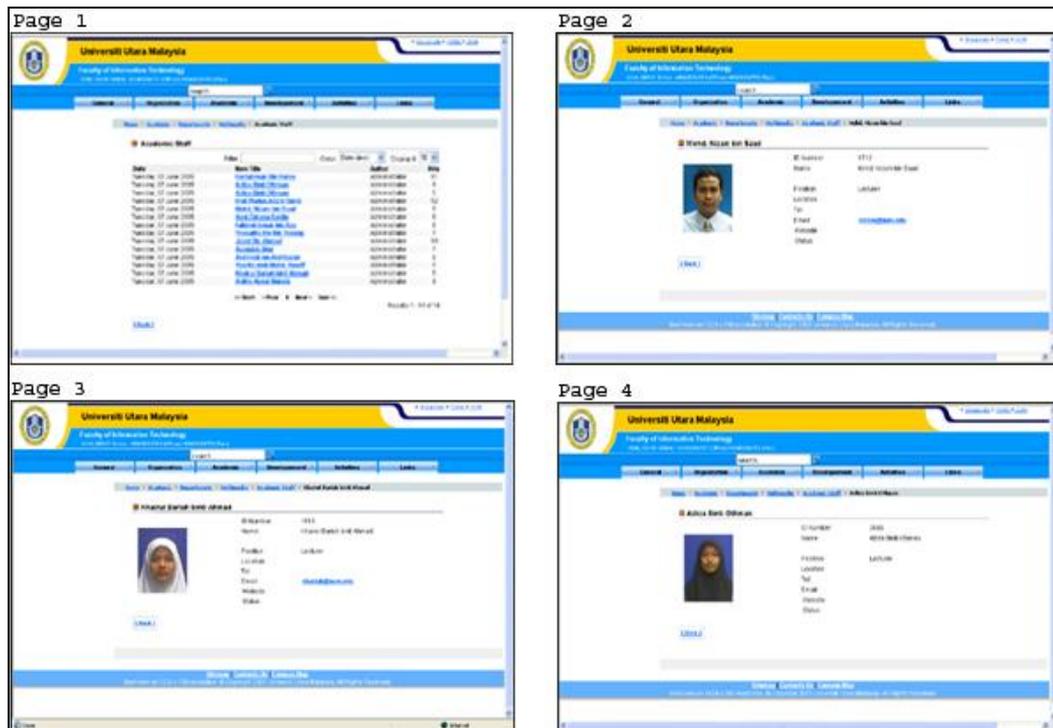


Figure 2.6: Sample of multimedia lecturers' information in multiple pages

As mentioned in previous explanation, RIA offers so much more advantages over the traditional method; hence, the RIA prototype has its upper hand over the existing web site. Further discussion regarding the prototype is resumed in Chapter Four.

2.7 RIA Testing

After the process of prototype development completed, the prototype must be tested on a small group of targeted users for its usability, specifically its perceived usefulness and ease of use. According to Dumas and Redish (1999), usability means that the people who use the product can do so quickly and easily to accomplish their own task and usability testing is a systematic way of observing actual users trying out a product and collecting information about the specific ways in which the product is easy or difficult for them.

However, it is well known that people rarely use the recommended usability engineering methods on software development projects in real life (Nielsen, 1993). This is due to the reason that usability engineering methods tends to intimidate people with its complexity, time consuming, and expensive cost (Belotti, 1988). Therefore, the researcher chooses to use discount usability engineering. Discount Usability Engineering has been developed by Jakob Nielsen and is a simple method for evaluating interfaces and using a few (three to five) experts. This method is much simpler and stands a better chance of actually being used in practical design situations (Nielsen, 1994).

In order to collect users' data, questionnaire created by Davis (1989) was adapted. The questionnaire was chosen in parallel to the research second objective, which is to test the prototype's perceived usefulness and ease of use. Perceived usefulness is defined as the degree to which a person believes that using a particular system would enhance his or her job performance and perceived ease of use refers to the degree to which a person believes that using a particular system would be free of effort (Davis, 1989). Based on the definitions of the self-titled questionnaire, it is obvious that the researcher tested the prototype and collect data from identified target users hoping to acquire their acceptance of RIA over the traditional method.

2.8 Conclusion

As an evolving technology, RIA is an interesting approach opted to overcome the difficulties in retrieving information of FIT multimedia lecturers. Even though the client-server website is still the common option nowadays, RIA is believed to be bloomed in the near future especially with the intervention of Macromedia in tailoring its web development and animation tool towards the easiness in developing RIA (Stratford, 2003).

Macromedia Flash MX Professional 2004 by Macromedia itself is a breakthrough in delivering effective experiences to end users, enabling rich Internet applications that blend content, application logic, and communications. As rich clients emerge to make the Internet more usable and enjoyable, Macromedia Flash MX Professional 2004 provides a solid architecture for developers in embracing the future of internet application. Considering this, the current project is developed using RIA approach and Flash MX technology in order to accomplish the research's objectives.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

In the general field of IS, researchers have explored a variety of research methodologies. Each is appropriate for different aspects of research study depending on the domain and the philosophical position of the researchers.

The range of research studies requires various approaches, each with their advantages and disadvantages depending on the research focus and application domain. Empirical approaches include case studies, surveys, laboratory, and field experiments, various types of simulation and forecasting, as well as action research and ethnographic studies.

Nunamaker, Chen and Purdin (1991) see systems development as a research methodology that fits comfortably into the category of applied science, belonging to the engineering, developmental, and formulation types of research (p.89-106). The development of a method or system can provide:

- A perfectly acceptable piece of evidence in support of a proof, where proof is taken to be any convincing argument in support of a worthwhile hypothesis.
- System development could be thought of as a proof-by-demonstration.

There can be two categories of research, which are:

- Basic research
- Applied research

The first one is directed towards theory building; hence, the development of general knowledge of the society whereas the applied method requires that considerable field of study has already been done and certain level of maturity has been reached.

This prototype was developed after some research works in the field of RIA. The domain of the research is multimedia department of FIT, UUM. It is an applied type of research with framework on RIA already been laid by the Macromedia Inc.

The research methodology followed can be compared to the Nunamaker's as presented in Figure 3.1. It is a multi methodological research cycle, with the system development in the center. This research's methodology has been adapted from the Nunamaker et al. (1991) to better match with the research requirements (p.89-106).

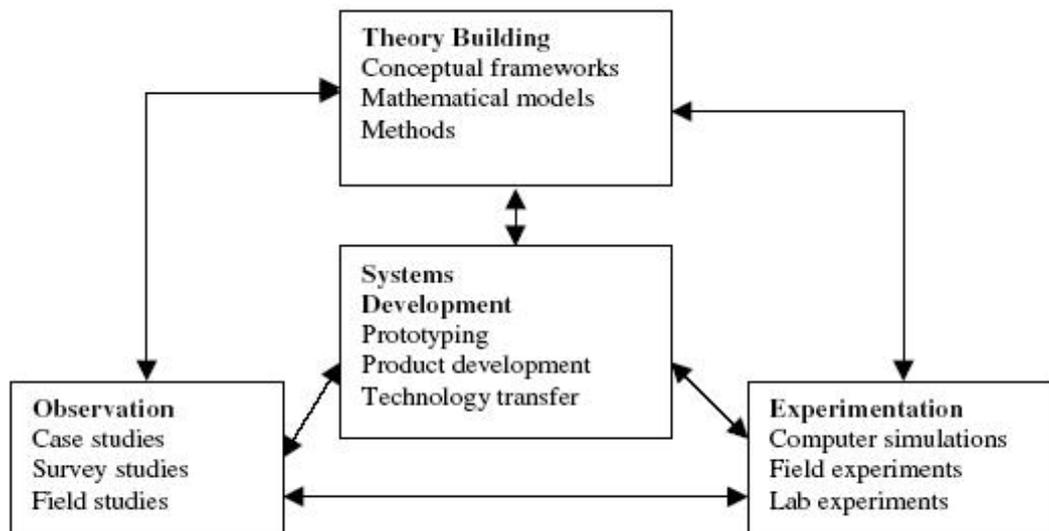


Figure 3.1: A Multi Methodological approach

The different stages of the method and the work done in context to that phase are as follows:

- Observation
- Experimentation
- Theory Building
- System Development

3.2 Observation

In general, various case studies, newsletters, journals, personal perspectives, and market trends were studied. The role of RIA in the field of web-based application was also investigated. Some of the authoritative sources used are Invision, Macromedia, TechLinks, and Softocon. This was done in order to prove and support the belief that RIA is the next solution to web application. Other than that, specific observation in UUM was conducted to affirm that RIA is not applied in any web development in the former domain in order for the research to be distinctive and irredundant.

3.3 Experimentation

This phase included study and experimentation of chosen technology for prototype development for the research, which are Flash MX and XML. The two technologies were explored and experimented in order to assure that they are capable in developing the prototype with features as per required by the research's scopes. For Flash MX, its components and actionscript were explored and experimented and as for XML, its structure and syntax were taken into view in order to confirm that the data can be exported into Interface created in Flash MX with the assistance of components and actionscript.

3.4 Theory Building

No work was done in this field. As the technology and framework are already being laid by Macromedia, the research is categorized in the Applied Method.

3.5 System Development

This phase is the central part of the methodology. It gathers information from all the other surrounding phases and deals with the main and the most important part of the development of the prototype. It deals with the designing the interface and the actual coding for the prototype development. The method chosen to develop the prototype was SWM, which will be discuss in detail in Chapter Four.

3.6 Conclusion

The methodology is beneficial in making research process easy and also manageable and relevant. The research contents were rich in information. Though Nunamaker method was not used entirely but adapted to the requirement of the research, it proved well worth and responsible for the successful completion of the research.

CHAPTER 4

PROTOTYPE DEVELOPMENT

4.1 Introduction

Developing an application requires a method to be followed to meet the standards and produce an efficient application. Ad hoc development approach results in inconsistency, errors, quality degradation, and overall failure of the project. The method to be followed for the prototype development should be decided in advance and measures should be taken that the actual decided method is followed.

There are many complex methods available and used, but the main aim of any method is to solve the purpose of development along with keeping it understandable. The method selected in this prototype development follows the principle of KISS in order to make things easier and better for developer especially a novice one (Schrand, 2001). As phrased by Schrand (2001), simple does not mean simplistic. It is about using only the elements that are absolutely necessary without going overboard with extraneous artwork that has nothing to do with overall concept.

This prototype is developed following a simple method for web engineering. The method is called SWM, which is developed by Griffiths, Hebborn, Lockyer, and Oates (2002). The selection of this method was subject to the basic philosophies that this method provides. The philosophies regarding the method used are:

- Be simple:

Can be used without extensive training. This was necessary as training time was not feasible due to time constraint. This makes it easy to use and first choice for students and inexperienced users.

- Strongly support early parts in lifecycle:

The early stages on the development are the most important. They decide the making or breaking of the prototype. These stages should be properly modeled and followed.

- Traceability:

Tracing for bugs and errors in both the direction is required. With less experience in development, discovery of bugs at the later stages makes it necessary to trace the application in the backward direction.

- Be tool supported:

Ideal to be used with tools that have a guidance support for the method.

- Be suitable for students and novice users.
- Be measurable.

The SWM method like all others is comprised of certain stages and techniques, which collectively make this method work. The stages that were followed are:

- Planning
- Analysis
- Design
- Building (coding and authoring)
- Testing
- Maintenance

4.2 Planning

This stage deals with the planning of developing the prototype. It starts with collecting the data required from the defined users. Then the tools for the development are chosen and the researcher familiarizes with it. After that, the

development of the prototype is drawn as guidance for development. The actual development or building process begins afterwards. Using the chosen tools and the data driven from the chosen users, the prototype is developed.

As the development process through, the discount usability testing process will be conducted on five selected users at their working environment. Questionnaire regarding perceived usefulness and ease of use by Davis will be distributed to users to rate. This is necessary in order to prove that by centralizing information using RIA approach, the prototype is useful and easy to use in assisting users to access information. Eventually the prototype will be maintained as time goes by in terms of updating new information available to be accessed.

4.3 Analysis

In this phase, the targeted audience was defined which were multimedia lecturers as defined by this research's scope. Apart from that, the contents required for the prototype development was also discerned. It was collected from all multimedia lecturers available in FIT in any formats possible be it orally (face to face and phone conversation), on paper (UUM's Academic Guidance Book), and electronically (email and websites).

Constraints are also analyzed such as the options tool available to develop the prototype other than Macromedia Flash MX Professional 2004, the expertise of the developer pertaining to the tool that going to be selected, and the copyright of materials used for the prototype development. Beside the audience and constraints, the market of Malaysia's and UUM's websites was also analyzed in order to find out the existence, implementation, and acceptance of RIA before the research was conducted.

4.4 Design

The design phase is occupied with the task of designing the outlook dressing or interface of the project. This is important for any multimedia application including multimedia web or internet based applications. A single simple and clean interface has been designed for the prototype as stated by McGloughin (2001), one of the pointers to help in developing good multimedia interface design is to keep it simple. As an addition, it is one of RIA key benefits to have a single screen interface in order to reduce multiple steps, eliminates multiple page-loads, and offers users a single application view, which results in improved user productivity and satisfaction (Macromedia, 2003).

This application was designed taking in to consideration the factors discussed above. The initial layout design was in form of storyboard sketches in order to define control, feedback, and usage of stages areas (McGloughin, 2001). Colors, fonts, navigation, and frames were also defined in the storyboard sketches. However, since this prototype focuses on functionality, the analysis of the interface design was not done thoroughly and more towards intuitively.

4.5 Building

The actual prototype development starts in this phase using the information derived from analysis phase. All the technologies chosen for development process were used in this phase.

The development was conducted using Flash MX Professional, a minor actionscript and an XML. The tool developed by Macromedia, the creator and main promoter of the RIA, is used to develop the front end, while the data was extracted from the XML file using components and data binding feature available in Flash MX

Professional. Data binding is a way to connect components to each other. Components are access points for data to be input into and output out of Flash. In addition, the graphical interface tool of the Flash MX makes it a better option for a good GUI application development and the easiness to design interface cuts development times massively.

The prototype was developed based on the very basic key feature of RIA, which is desktop functionality. The basic desktop functionality is a screen, which must not have a screen refresh like traditional websites. Having said that, Flash MX with its available components and data binding ability is an outstanding tool to develop RIA. It is because data binding prevents screen refresh while data is pulled from XML to be displayed on the interface. Not all RIA key features are incorporated in the prototype since it is a simple prototype developed in order to prove that RIA displays information better than traditional web method.

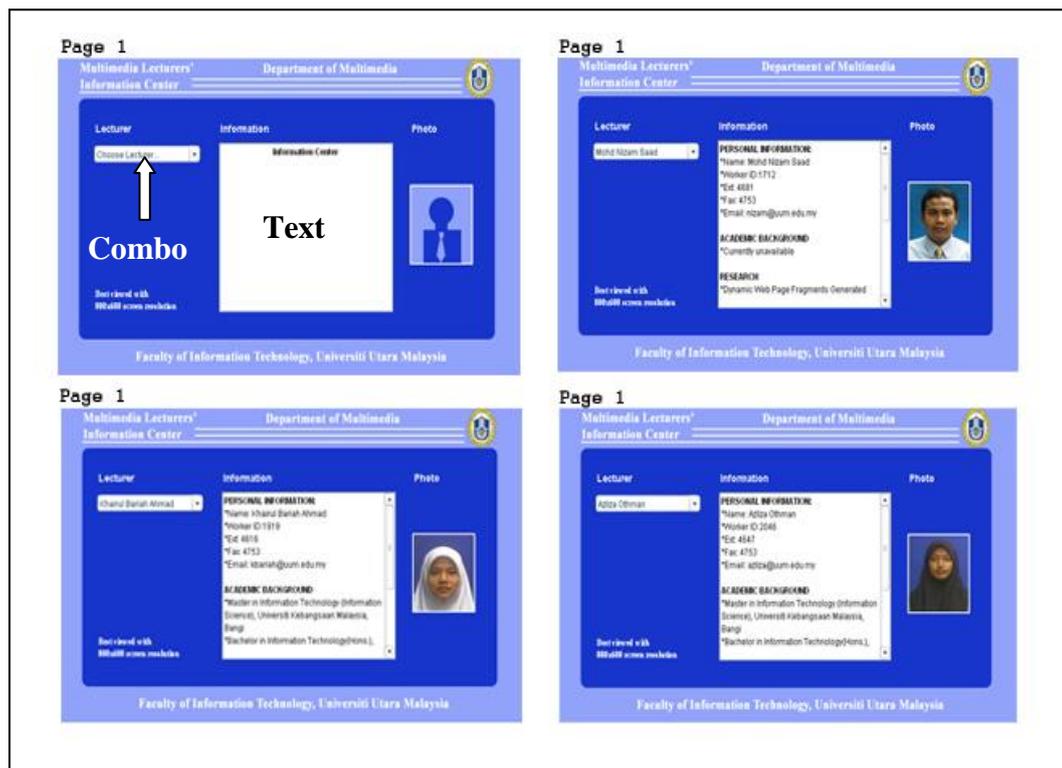


Figure 4.1: Sample of multimedia lecturers' information in one screen

As stated in the scope of this research, the development of the prototype revolves around multimedia lecturers' information. Therefore, data pertains to 17 multimedia lecturers were collected including pictures, personal, academic background, research, and publication information. The data were collected via interviews, UUM's academic book, and existing FIT's webpage. As shown in Figure 4.1, different multimedia lecturer's information can be retrieved and displayed in one screen without requiring many browsers to be opened and screen refresh. Starting with introduction page, users can navigate from one information to another by choosing lecturer's name from the combo box selection and automatically, information and picture regarding the selected lecturer will be displayed in the same browser and interface screen without needing any screen refresh.

4.6 Testing

Even though at the time of this research was conducted multimedia department consisted of 17 multimedia lecturers, only five multimedia lecturers were identified and selected as the target users to discount test the prototype's perceived usefulness and ease of use as stated by this research second objective. According to Kheterpal (2002) a discount test is a simple test which use a limited number of participants (five to six) and conducted in an informal environment thus making the participants comfortable with their surroundings. Therefore, the test was conducted in FIT at the selected lecturer's room and a task was given to them.

The task was simple which is they have to access multimedia lecturers' information from the prototype and compared it with the process of accessing information from traditional website developed ICT unit of FIT. They had to use the computer that they use daily to perform their tasks and the same internet connection

provided by UUM to access the RIA prototype in order to test it. Using questionnaire formed by Davis (Perlman, 2006), the result of users' perceived usefulness and ease of use of the prototype was collected (Refer to Appendix A for sample of questionnaire). The finding of the test is elaborated in detail in Chapter 5.

4.7 Maintenance

As the prototype finished through with testing, it needs to be maintaining from time to time. The word maintain in the aspect of this research prototype is that to keep it update as new content available. Since the scope is multimedia lecturers' information, hence the update must be related to the scope. In this case, if new lecturers join multimedia department or existing information needs to be updated or changed, then the prototype is updated.

The beauty of RIA is that the process of updating its content is considerable easy. Since the prototype was developed using Flash MX and XML, the data was contained in XML while Flash XML contained the interface and all the components necessary to bind the Flash MX and XML in order to display data as information. Therefore, if any information requires updating, programmer or multimedia developer does not have to bother with Flash elements at all. Instead, the updating process takes place in XML file. Any changes and updates in XML will affect information displays in interface created with Flash MX since the particular components in the interface have already bound to the data in XML. Ones only need to tamper with Flash elements incase of interface changes or new data binding processes.

4.8 Conclusion

Following the SWM approach, the process of developing the prototype has become easy. With its philosophy (be simple, strongly support early parts in lifecycle, traceability, be tool supported, be suitable for novice, be measurable) and its adapted stages (planning, analysis, design, building, testing, maintenance), this method of engineering web application has provided developer with guidance that is uncomplicated and produced result at the same time.

CHAPTER 5

RESULT AND FINDINGS

5.1 Introduction

In order to develop a good application, reviews and reactions are very important for what is good can be considered as less good or bad by other persons. Any application generally and RIA specifically is after all built for end users and thus the developer's choice holds very less importance. As this research's second objective emphasized, the prototype has to be tested for its perceived usefulness and ease of use after its development phase.

The test was conducted on five multimedia lecturers based on discount test method. Each lecturer was given a questionnaire form specifically generated to by Davis to rate the usefulness and ease of use of the prototype developed (Perlman, 2006). According to the questionnaire form circulated, the lecturers have to use the prototype and then rate it based on its perceived usefulness and ease of use respectively. After the test, the questionnaire forms were evaluated and the feedback data was drawn as graphs to clearly show the expected outcome of this research which is to show that RIA is a good approach to present information (Refer to Appendix B for feedback data collected).

5.2 Perceived Usefulness

For this section, there are six items that users were required to respond to in order to rate the prototype's perceived usefulness. The items are:

1. Using the application in my task would enable me to accomplish it more quickly
2. Using the application would improve my task performance
3. Using the application in my task would increase my productivity
4. Using the application would enhance my effectiveness on the task given
5. Using the application would make it easier to do my task
6. I would find the application useful in my task

Respondents were to rate based on the items above in the questionnaire form given. Based on the feedback data collected from five respondents, a graph is drawn as depicted in Figure 5.1.

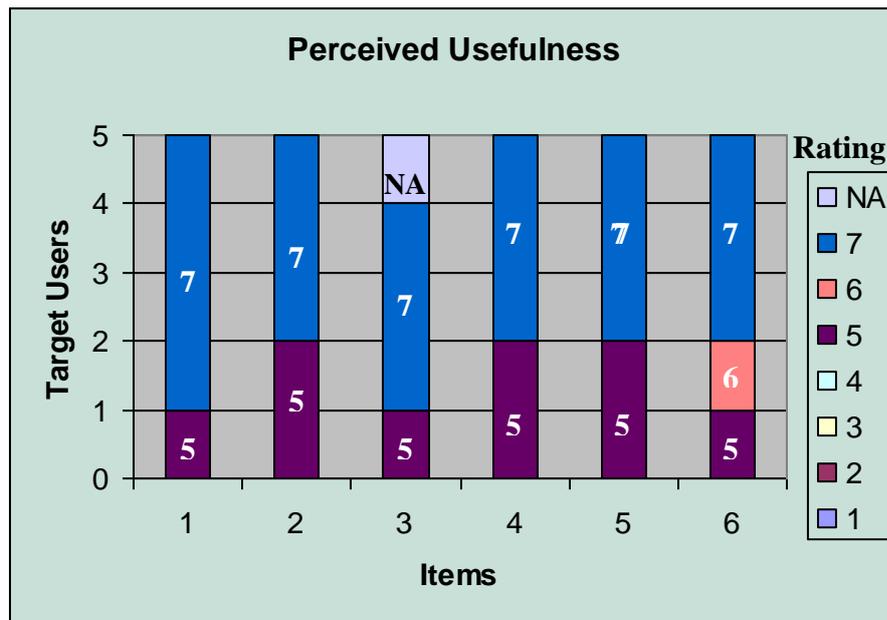


Figure 5.1: Graph of perceived usefulness

Based on the graph above, the ratings started from one to seven, which represents unlikely to likely rating and there is NA that represents not applicable

incase the respondents find that the item has nothing to do with the prototype's perceived usefulness. Based on the graph drawn, mean analysis was done and the result is display in Table 5.1.

Table 5.1: Mean analysis for perceived usefulness

Items	Mean
1	6.6
2	6.2
3	5.2
4	6.2
5	6.2
6	6.4
Overall	6.1

For Item 1, most respondents found that using the prototype enable them to accomplish their task more quickly since the result of the analysis shows highest number of all items, which is 6.6. Meanwhile for Item 2, the result of the analysis is 6.2. Still the number of respondents who found that the prototype most likely improved their task performance is high. Next is Item 3. For this item, the analysis shows that the result is a little bit low in comparison to Item 1 and 2. However, it is still heavily tilted towards the likeliness the prototype assists in increasing productivity.

For Item 4 and 5, the analysis shows an equal result to Item 2 which is 6.2. This means the prototype enhanced the effectiveness on the task given and makes it easier to do the task. For the last item, which is Item 6, the result of the analysis shows the second highest after Item 1. Clearly, respondents found that the prototype

was very useful in their task. As the last result, an overall analysis had been done and the result shows 6.1.

As the graph and mean analysis showed, for all the items, the number of respondents who rated seven beat the rest of the ratings and the overall result of the analysis is above six out of seven ratings. This clearly shows that the prototype is useful in assisting users to access centralized information.

5.3 Perceived Ease of Use

For this section, there are six items that users were required to respond to in order to rate the prototype's perceived ease of use. The items are:

7. Learning to operate the application would be easy for me
8. I would find it easy to get the application to do what I want it to do
9. My interaction with the application would be clear and understandable
10. I would find the application to be flexible to interact with
11. It would be easy for me to become skillful at using the application
12. I would find the application easy to use

Respondents were to rate based on the items above in the questionnaire form given and based on the feedback data collected from five respondents, a graph is drawn as depicted in Figure 5.2.

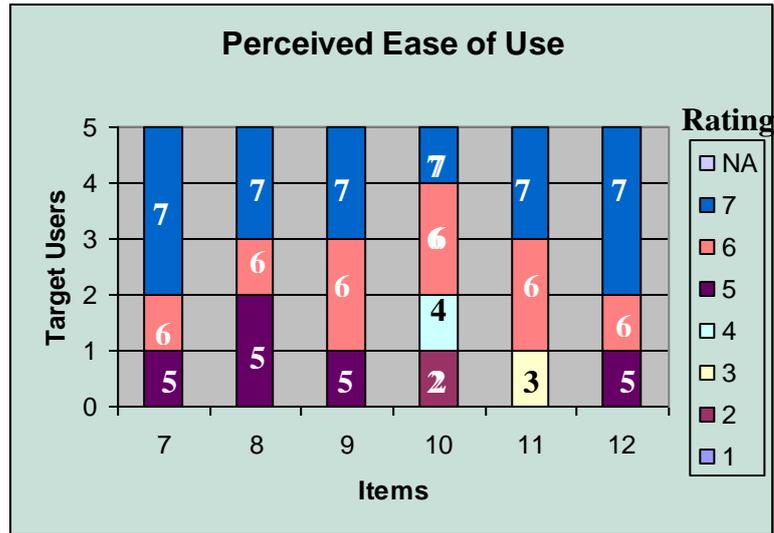


Figure 5.2: Graph of perceived ease of use

Based on the graph above, the ratings started from one to seven, which represents unlikely to likely rating and there is NA that represents not applicable incase the respondents find that the item has nothing to do with the prototype's perceived ease of use. Based on the graph drawn, mean analysis was done and the result is display in Table 5.1.

Table 5.2: Mean analysis for perceived ease of use

Items	Mean
7	6.4
8	6.0
9	6.2
10	5.0
11	5.8
12	6.4
Overall	6.0

For Item 7, based on the result of the analysis, which is 6.4 shows that most respondents found that it is easy to learn to operate the prototype since it has the highest result among all items. Meanwhile for Item 8, the analysis produced 6.0, which still shows the tendency of easy to get the application to do what they want. Next is Item 9. The analysis shows a higher result than Item 8, which is 6.2. For this fact, clearly more respondents found that their interaction with the prototype were clear and understandable. Nevertheless, for Item 10 and 11, the result is below six, which are 5.0 and 5.8 respectively. However, the results are still above four which shows that there was respondent that found that the prototype is flexible to interact with and easy to become skillful at using the application. For the last item, the result of the analysis shows equality with Item 1, which is 6.4. Apparently, respondents found that the application is easy to be used. As the last result, an overall analysis had been done and the result shows 6.0.

As the graph and mean analysis showed, for all the items, most of respondents rated six and seven and the overall result of the analysis is six out of seven ratings. This clearly shows that the prototype is easy for users to use in accessing centralized information.

5.5 Conclusion

This research testing process has been conducted on five respondents. Based on the data collected using perceived usefulness and ease of use questionnaire form , the graphs charted and mean analysis performed from the collected data, it is obvious that the prototype developed is useful and easy to use in accessing information. The results of the mean analysis showed that the second objective of the research is met which is to test the web application's perceived usefulness and ease of use on selected

users with multimedia background after the first objective is met which is to develop a simple prototype of web application using RIA approach to centralize information.

CHAPTER 6

DISCUSSION AND CONCLUSION

6.1 Introduction

This section is the conclusion of the research and dedicated to discuss about the outcome of it.

6.2 Discussion

This research began with the idea of creating websites that provide information pertaining to multimedia lecturers. It came with the intention to ease users such as students to know better a particular lecturer per say an expert area. Then the idea of using RIA approach instead of traditional websites emerged and off the research conducted with that idea. Using the approach, RIA not just provides information but also centralized it into one interface giving the benefit of no screen refresh every time user make new selection. It also supports faster data transmission (less bandwidth consumption) since the data resided in XML file and pulled into the interface created only when user required the data. Based on the test conducted and the results analyzed via mean analysis, it is apparent that users found that the RIA prototype developed is useful in assisting them to access information and ease to be used with overall mean analysis result 6.1 and 6.0 respectively.

6.3 Future Works

The focus of the research is to develop a simple web application using RIA approach in order to centralize information and the scope is multimedia lecturers. It does not become the researcher main concern regarding the issue of creating an interface that is more users friendly. There is much room for improvement regarding the prototype's interface and its functionality since RIA has limitless potentials for improvement. In future, the issues mentioned can be a good thrive to conduct an extension research to the current one. In addition, the scope and data populated for the prototype can be widen and increased.

6.4 Conclusion

Web technologies are growing from time to time. Each day new technologies towards making the web more dynamic emerge. RIA is one of technology appeared from Macromedia and it promises bright future for incorporating multimedia elements and richness. It brings new perspective into web technologies among many. For that reason, it has been chosen to be the research's substance and the researcher's catalyst to complete the research. To conclude from the test conducted, it can be deduced that the research fulfilled its objectives.

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